Macintosh

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Macintosh IIci: Overview

The Apple® Macintosh® IIci is Apple's highest-performance personal computer, delivering a performance increase of up to 55 percent over that of the Macintosh IIcx and IIx. The balanced system design features a faster microprocessor, built-in video, and enhancements that optimize microprocessor capabilities.

In many respects, the Macintosh IIci is similar to the Macintosh IIcx. For example, it has the same physical dimensions, and it contains three NuBus™ expansion slots, space for an internal 3.5-inch hard disk, an internal Apple FDHD™ SuperDrive™, and the standard Macintosh I/O ports. It also uses the same power supply as the IIcx.

Features of the Macintosh IIci that are new to the Macintosh family include the following:

- Increased speed: The Macintosh IIci has a 25-megahertz (MHz) 68030 processor and a 25-MHz 68882 floating-point coprocessor.

- Built-in video: The Macintosh IIci has the equivalent of a video card built into the main logic board. This means that Macintosh IIci owners don't have to purchase a separate video card to use an Apple monitor with the unit. Because video capability is built into the computer, all three NuBus slots remain available for other cards—including other video cards. The built-in video circuitry supports the following monitors:
  - —Apple High-Resolution Monochrome Monitor (up to 256 levels of gray simultaneously)
  - —AppleColor™ High-Resolution RGB Monitor (up to 256 colors or levels of gray)
  - —Apple Macintosh Portrait Display (up to 16 levels of gray)

- Support for an optional cache card: In addition to three NuBus slots, the Macintosh IIci has a slot specifically designed for a cache memory card, the installation of which further improves system performance.

- RAM parity support: The Macintosh IIci supports RAM parity when a Parity Generator/Checker (PGC) chip and Macintosh IIci nine-bit RAM SIMMs are installed.

Processor Enhancements

Users will find that the Macintosh IIci is perceptibly faster than the other members of the Macintosh II family. The speed increase relates to the following factors:

- 25-MHz processor speed. The Macintosh IIci computer uses the Motorola 68030 processor and the Motorola 68882 coprocessor—as do the Macintosh SE/30, IIcx, and IIx. In the IIci, however, the processor and coprocessor run at 25 MHz instead of 15.6672 MHz.

- 68030 burst reads. The 68030 supports burst reads to its on-chip data and instruction caches. The 256-byte 68030 data and instruction caches are each organized in sixteen lines of four long-word entries, into which the 68030 can save instructions or data. When burst mode is disabled, it takes five processor cycles to fetch each long-word entry into the cache. The entries are read into the cache one entry at a time. To fill an entire cache line, it takes 20 cycles (5 + 5 + 5 + 5 = 20 cycles).

  When burst mode is enabled, the on-chip cache entries are filled one line at a time. It takes five

cycles to fetch the first entry, but it takes only two cycles to fetch each of the remaining three entries, resulting in a total of 11 cycles to fill the entire cache line (5 + 2 + 2 + 2 = 11 cycles). This mode is sometimes called the "5 2 2 2" burst mode. It is automatically enabled by the Macintosh operating system when the machine is turned on.

Built-in Video

All earlier members of the Macintosh II family require at least one NuBus video card for video output. The video capability built into the Macintosh IIci uses a 15-pin video port on the back of the IIci case. Though you don't have to purchase a separate video card to use an Apple monitor with the unit, you can add other video cards—something you might want to do for any of the following reasons:

- To connect multiple monitors: The Macintosh IIci can support multiple monitors—one through the built-in video port and up to three through NuBus video cards.

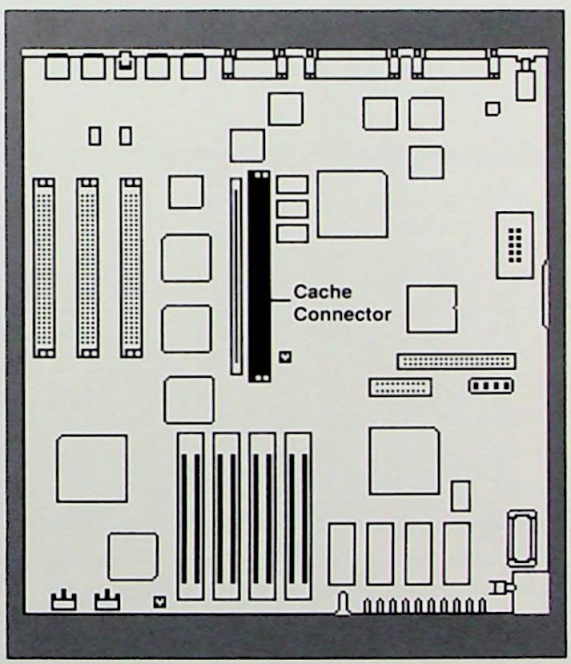
- To connect monitors not supported by the built-in video capability: Each monitor has specific video card requirements. If you want to use a monitor that isn't supported by the IIci built-in video circuitry, you must add the appropriate video card.

- To use special video functionality: Currently, there are video cards that support up to 32-bit-per-pixel display, video overlay, genlock, and other types of video functionality. You can use any of the three NuBus slots for such cards.

- If optimal performance at higher bit depths is important, you can install a NuBus video card that provides 256 colors or shades of gray.

Cache Connector

The Macintosh IIci cache connector enables you to install an optional cache card, which can increase system performance by 20 to 30 percent. Storing data within very high-speed SRAM (static RAM), a cache card improves performance by minimizing the number of accesses to the slower DRAM (dynamic RAM). The location of the cache connector on the logic board is shown in the figure below.



Please note that though the Macintosh IIci cache connector is similar to the direct slot in the Macintosh SE/30, it is not compatible with it. The clock speed, pin mapping, power budget, and specifications for physical dimensions are different in the two connectors. Installing an 030 Direct card in the IIci connector—or installing a IIci cache card in the 030 Direct Slot of the SE/30—may cause damage to the logic board or the card.

Optional Parity Support

The Macintosh IIci is the first member of the Macintosh family that can support RAM parity, a type of error checking that allows the system to detect single-bit errors in RAM and, should it identify damaged data or instructions, prevents the system from continuing to operate.

New ROMs

Earlier members of the Macintosh II family have 256K of ROM; the Macintosh IIci has 512K. The extra memory is needed because several new Toolbox and operating system managers have been added to the Macintosh IIci ROM. Because the IIci has new hardware components, extra code is necessary to manage them. Patches that were previously in the System File are now included in ROM, and numerous enhancements help to optimize and generalize the ROM code. Specific changes to the ROMs include the following:

- 32-bit addressing support (32-bit clean): The Macintosh operating system runs in a 24-bit world. In other words, the hardware ignores the high byte of all memory addresses. Software capable of running in a 32-bit environment is said to be 32-bit clean. Most of the code in the IIci ROM has been modified to be 32-bit clean. Macintosh System Software Version 6.0.4 is a 24-bit environment; 32-bit addressing will not be supported until the release of Macintosh System Software Version 7.0.

- 24-bit/32-bit Memory Manager: The Memory Manager has been modified to handle both a 24-bit and a 32-bit environment.

- 32-bit QuickDraw: 32-bit QuickDraw™ provides various extensions to Color QuickDraw, the most notable of which is the ability to support direct color devices and frame buffers greater than 1MB at all pixel sizes.

- Slot Manager: The Slot Manager contains routines that allow software to identify NuBus cards and to communicate with the firmware on each card. A new version incorporated into the Macintosh IIci ROM supports enabling or disabling slot resources on the fly, and gives you the current Slot Manager version.

- Script Manager: This set of extensions to the standard Macintosh Toolbox and operating system does two things:
  —It provides standard tools for the sophisticated manipulation of ordinary text.
  —It provides a standard method for translating an application into another writing system.

- Notification Manager: The Notification Manager provides a set of calls for applications to generate alerts or warnings when they are running as background tasks under the MultiFinder™ system.

- Time Manager: Improved to allow drift-free timing, the Time Manager now also has a 20-microsecond resolution. The previous maximum resolution was 1 millisecond.

Support Issues

- **Macintosh System Software**

The Macintosh IIci requires the Macintosh System Software Version 6.0.4 or later. Attempts to boot from versions earlier than 6.0.4 will result in a dialog box that reads "This startup disk was created with a 'Minimum' installer script and will not work on this model Macintosh. Use a standard installer script to update the disk for different models."

Most of the changes incorporated into Version 6.0.4 are required by the Macintosh IIci and Macintosh Portable hardware. These changes include the following:
—The Multi-Disk Installer (new)
—The Sound Manager (modified to use the Time Manager to provide fixed-frequency timing)
—The SysEnvirons call (modified to support the new computers)
—The Responder (modified to support the new computers)
—Code that supports parity
—The Monitors CDEV (changed to support setting the amount of memory allocated to video)
—CloseView 1.1 (modified to improve the interface)

The Macintosh System Software Version 6.0.4 is now included with all Macintosh models.

- **HyperCard**

HyperCard® Version 1.2.5 software was released with the Macintosh IIci and the Macintosh Portable. No enhancements were included in Version 1.2.5; changes were made to ensure compatibility with the new models. Only System Software 6.0.4 users need HyperCard Version 1.2.5.

- **A/UX**

The Macintosh IIci requires A/UX® Version 1.1.1 (or later).

Available Configurations

The Macintosh IIci is available in the following configurations of RAM and internal disk storage:

- 1MB of RAM; SuperDrive
- 1MB of RAM; SuperDrive; 40MB hard disk
- 4MB of RAM; SuperDrive; 80MB hard disk
- 4MB of RAM; SuperDrive; 80MB hard disk; parity support
- 4MB of RAM; SuperDrive; 80MB hard disk with A/UX installed

Included with the standard four disks of the system software set is a fifth floppy disk that enables the installation of currently available Apple networking and communications products on the Macintosh IIci. The disk contains scripts and instructions for installing the following Apple networking and communications products:

- EtherTalk® Driver (and Network CDEV)
- TokenTalk® Driver (and Network CDEV)
- AppleShare® File Server
- AppleShare Print Server (application and printer drivers)
- Macintosh SMB File Transfer Utility
- AppleTalk® Internet Router
- AppleShare IIGS® Setup (requires Apple II Setup disk Version 2.1.1 or later)

Please note that the networking products themselves are not included; they must be purchased separately.

Upgrades

Macintosh IIcx owners who want to upgrade to the IIci can purchase the Macintosh IIci Logic Board Upgrade (M0295LL/A), which includes the logic board, a complete accessory kit, a new internal hard disk power cable, and a bottom case that accommodates the new video connector.

Cache memory cards for the cache connector are available from third-party companies; Apple will introduce a cache memory card in the spring of 1990.

Macintosh IIci Q&A

Thanks to the Technical Support East organization, in whose publication "Tech Tidbits" these questions and answers were first published.

Q: Why would I choose a Macintosh IIci over a IIcx?

A: Both models feature high performance, flexibility, expandability, and color compatibility in a system with a small footprint. If you require more speed, and if you need to use all three NuBus slots, purchase the IIci.

Q: Why would I choose a Macintosh IIci over a IIx?

A: If you need more speed, and if you don't need six NuBus slots, choose the IIci. If you need more than three NuBus slots, or if you need a very large-capacity internal hard disk, choose the IIx.

Q: Why would I purchase a cache card?

A: A cache card is particularly appealing to those who use the built-in video capability. For approximately the same price as a NuBus video card, you can add a cache card to improve video performance, while leaving all NuBus slots open for other uses. Users who want to improve overall speed may also choose a cache card.

Q: How much RAM does the built-in video feature of the Macintosh IIci use?

A: The built-in video circuitry of the Macintosh IIci utilizes standard RAM installed in SIMMs on the logic board. Here's a table listing the RAM allocated to each video mode, based on the type of monitor you have connected:

AppleColor High-Resolution RGB Monitor Apple High-Resolution Monochrome Monitor		Apple Macintosh Portrait Display	
Maximum Colors/Grays	Allocated Memory	Maximum Colors/Grays	Allocated Memory
2*	64K RAM	2*	96K RAM
4	96K RAM	4	160K RAM
16	160K RAM	16	320K RAM
256	320K RAM		

* Macintosh IIci configurations with 1MB of RAM default to black-and-white only.

Q: Why would I want to buy a parity Macintosh IIci unit?

A: Institutions such as the federal government, the military, and many universities include parity in their checklist of computer requirements. In most cases, individuals will not need the parity feature.

Macintosh Portable: Overview

In September 1989, Apple introduced the Macintosh Portable computer, a system that combines complete Macintosh functionality with a portable design. The Portable runs virtually all current versions of Macintosh software and provides full compatibility with other Macintosh hardware. Using the Active Matrix Liquid Crystal Display, the Portable delivers the superior graphics that people have come to associate with the Macintosh. Intelligent power management and a dedicated power manager processor combine to give the Portable a 6- to 12-hour battery life. The computer comes standard with 1 megabyte of RAM and is available in two configurations: with a built-in Apple FDHD SuperDrive, or with an Apple FDHD SuperDrive and an internal 40-megabyte hard disk.

Standard features of the Macintosh Portable include the following:

- 16-MHz MC68HC000: The low-power 68000 microprocessor runs at twice the speed of the microprocessor in the Macintosh SE and uses less power than conventional-technology processors.

- Active Matrix Liquid Crystal Display: This high-contrast screen features a wide viewing angle and displays the full width of a letter-size page. Its fast response rate maintains the Macintosh "look and feel." (Display: 9.8 inches diagonally; 640 by 400 pixels; 75 dpi.)

- Dedicated power manager processor: The power manager monitors system components and puts them into a standby "rest" or "sleep" mode when not in use, retaining the contents of memory. It also monitors battery voltage and lets the user know how much charge remains in the battery.

- Rechargeable sealed lead-acid battery: Providing 6 to 12 hours of power, the lead-acid battery allows the computer to monitor voltage levels and provide information about remaining power. The battery can be recharged at any time without a deep discharge cycle.

- Full-size Macintosh keyboard: The layout and feel are identical to the layout and feel of the Apple Keyboard.

- Integrated trackball: The trackball can be configured for right- or left-handed users.

- Low-power Apple Desktop Bus™ mouse

- Internal Apple FDHD SuperDrive: Apple's high-density floppy disk drive enables you to format, read from, and write to Apple 400K, 800K, and 1.4MB floppy disks, as well as ProDOS®, MS-DOS, and OS/2 720K and 1.44MB floppy disks. (See the article "SuperDrive and Disk Compatibility," page 27.)

- Apple stereo sound: With stereo speakers or headphones attached to the system, the Macintosh Portable can produce high-quality stereo sound.

- External ports: Eight ports accommodate the power adapter, stereo sound, video out, two serial devices, an Apple Desktop Bus device, an external SCSI device, and an external floppy disk drive.

- Macintosh System Software Version 6.0.4 and HyperCard Version 1.2.5: These versions of the software are required only for the Macintosh Portable and the Macintosh IIci.

- Four internal expansion slots enable you to expand the performance of the Macintosh Portable in the following ways:
  —The RAM slot: You can upgrade internal memory to 2MB with an Apple 1MB memory expansion card.
  —The Processor-Direct slot: You can install additional RAM or cards from third-party vendors.
  —The modem slot: You can install the Macintosh Portable Data Modem 2400 (U.S. and Canada), the Apple International XP 2400 Modem (Europe), or other internal modems designed for the Portable.
  —The ROM slot: You can upgrade system ROM or add third-party ROM enhancements.

- 1MB of low-power RAM, soldered onto the logic board

- 256K of ROM based on the Macintosh SE ROM

- Power adapter: This universal power supply operates with 85 to 270 volts AC at 48 to 62 Hz.

- Carrying case: Internal pockets accommodate items such as the power adapter, mouse, extra battery, and disks.

- Polycarbonate plastic housing: Provides durability and reduces the need for special handling.

Power Management

The dedicated power management microprocessor monitors the activity of each component of the Macintosh Portable, providing the following system advantages:

- **Rest Mode**

The power manager optimizes power allocation and automatically puts the system into a standby "rest" mode when there is no spinning cursor, AppleTalk activity, or Apple Desktop Bus activity. In rest mode, the system operating speed decreases from 16 MHz to 1 MHz, while retaining memory contents.

- **Sleep Mode**

The Portable will automatically go into "sleep" mode when it has been inactive for a user-preset period; the setting is located in the Control Panel. You can also put the computer to sleep manually by selecting Sleep from the Special menu or from the Battery desk accessory. In sleep mode, power to most system components is turned off. The Portable retains the contents of memory in sleep mode and allows you to wake up the system by pressing any key on the keyboard.

- **Battery Desk Accessory**

The Battery desk accessory monitors power levels and displays a meter—much like a fuel gauge—that indicates the amount of charge left in the battery.

- **Low-Power Warnings**

The power manager posts explicit, unmistakable warnings on the screen when the battery is getting low. After the fourth warning, the system automatically goes into a sleep state. From this point, the battery holds the memory contents for about five

days. The system does not wake up unless the AC adapter is plugged in or a charged battery is installed. You never have to worry about running out of power unexpectedly.

Screen Technology

- **Active Matrix Liquid Crystal Display**

The Macintosh Portable Active Matrix Liquid Crystal Display (LCD) represents the latest display technology. Instead of using multiplexing techniques to address the matrix of crystals, the Active Matrix LCD includes a transistor fabricated with each pixel. You can think of the display as one large integrated circuit, with the transistors acting as switches to turn on individual pixels at a very fast rate.

The matrix-addressed display, used in most LCD displays on the market, employs a row-and-column addressing scheme, updating one row at a time. Screen electronics activate the voltage in the first row and then apply a voltage to the columns. The display moves to the next row and repeats the process until it reaches the bottom of the screen.

The Active Matrix method eliminates the time dependency associated with multiplexed displays, allows each pixel to be addressed directly, and allows animated objects to be seen more clearly. In addition, having one transistor per pixel provides greater contrast between the pixels that are turned on and those that are turned off, thus making the display easier to read.

- **Display Electronics**

The display uses a digital signal to generate information. Three signals are generated in the video logic integrated circuit:

—The pixel synchronization signal, which marks the end of a byte

—The horizontal synchronization signal, which marks the end of a 640-pixel line

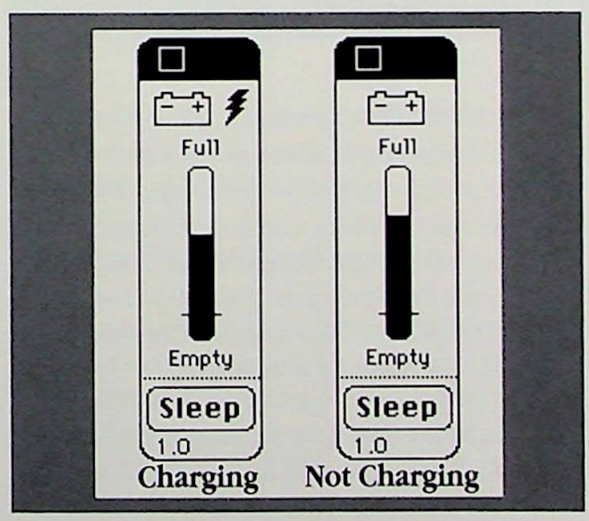
—The vertical synchronization signal, which marks the beginning of a new video frame

Macintosh System Software 6.0.4

The following new features in System Software Version 6.0.4 support the Macintosh Portable.

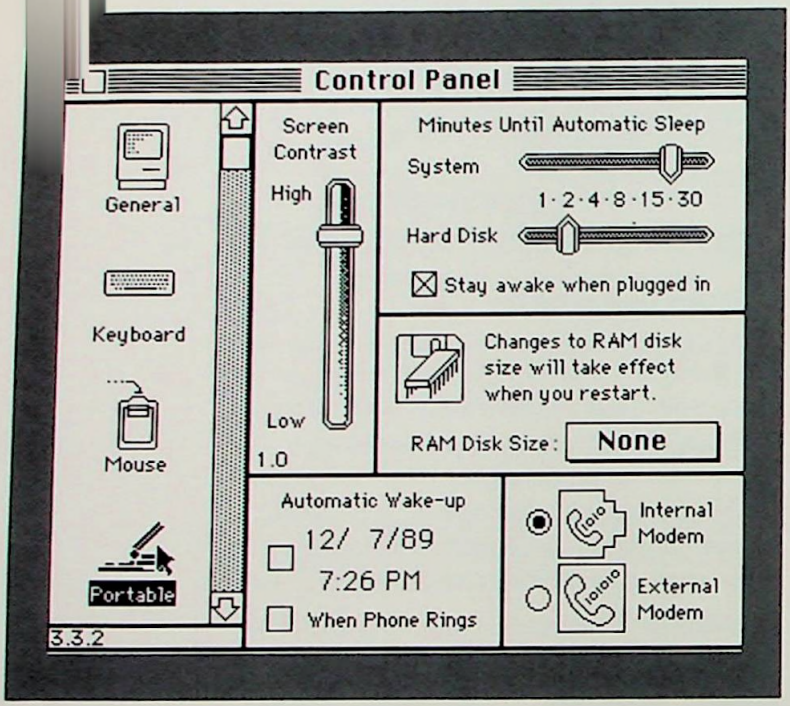
- **Battery Desk Accessory**

The Battery desk accessory (illustrated below) indicates the charge remaining in the battery. It also displays a lightning bolt next to an image of the battery when the unit is charging. When charging is finished, the lightning bolt disappears, even though the power adapter is still plugged in. Pressing the Sleep button causes the Macintosh Portable to go to sleep immediately.



- **Portable CDEV**

The Portable CDEV (Control Panel device) lets the user adjust the screen contrast, sets sleep parameters, and automatically wakes up the Macintosh Portable at a user-specified time.



The Portable CDEV (illustrated above) also allows users to designate part of memory as a RAM disk for application and system software storage. For example, you can install a "minimum system" on the RAM disk and set the RAM disk as the startup device. By placing a frequently used application and the System Folder in the RAM disk, you can minimize hard disk operation and save power.

The External Ports

The Macintosh Portable furnishes the standard Macintosh external ports, contributing to complete Macintosh functionality. (See the illustration on page 11.)

When you connect devices to the external ports, you must first shut down the computer by using the Shut Down command in the Special menu; otherwise, you may damage the computer. Choosing Shut Down ensures that the ports are powered down. When the system is powered up again, the Finder™ will identify the peripherals that you have connected to the external ports.

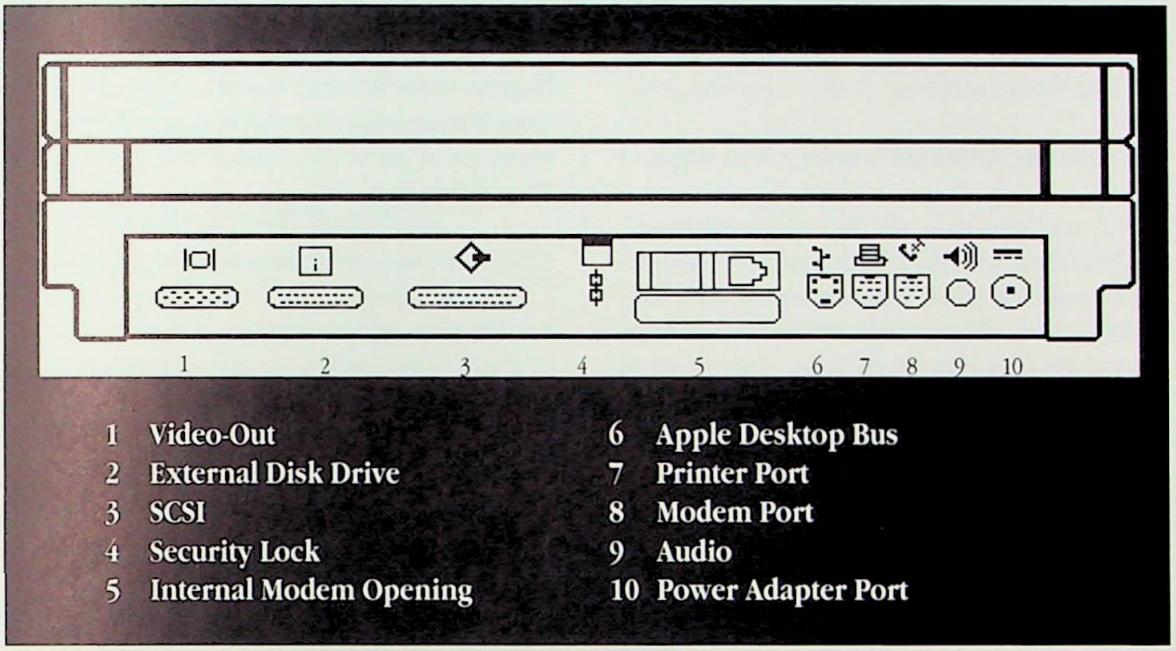
- **Video-Out**

The Macintosh Portable produces signals for an external video adapter through an 8-bit interface that is similar to the interface for the built-in display. You need a video adapter to convert the 8-bit data stream into a signal that can drive an external video device. (See the Video Adapter item in the section "Macintosh Portable Options," later in this article.)

- **External Disk Drive**

The DB-19 disk drive port uses the SWIM chip—the same chip used by the Macintosh SE/30, IIcx, IIx, and IIci. Because the ROM in the Portable is based on the Macintosh SE ROM, it can support the following drives:

—Macintosh 800K External Drive
—Apple 3.5 Drive
—Apple External FDHD SuperDrive
—Apple HD 20 (non-SCSI drive; no longer sold)



The SWIM chip doesn't support the 400K drive. You can use two internal SuperDrive floppy disk drives and one external floppy disk drive (800K or SuperDrive).

- **SCSI**

The Macintosh Portable, like the Macintosh Plus and all later Macintosh computers, has a DB-25 SCSI port. It is controlled by the NCR 53C80 SCSI chip. You can connect up to seven external SCSI devices (or an internal hard disk and six external devices) over the SCSI bus.

The Portable doesn't supply terminator power; the external device must supply the terminator power for the SCSI bus.

Before you attach SCSI devices, use Shut Down from the Special menu. You can then plug in SCSI devices without damaging the computer. (You must shut down the system to have the system software recognize the newly added devices.) Note that external devices connected to the Macintosh Portable *must* be powered on and ready before you wake up the Portable. Until they are powered on and ready, the Macintosh Portable will not boot.

- **Security Connector**

The security connector is used to secure the Macintosh Portable to a desk or table; you'll need the appropriate additional hardware.

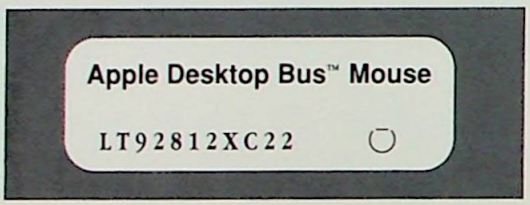
- **Internal Modem Opening**

The phone line connects to the optional Macintosh Portable Data Modem 2400 (or Apple International XP 2400 Modem), an internal asynchronous modem that can exchange information with any other standard data modem at 300, 1,200, and 2,400 bits per second. Specifically designed for the Macintosh

Portable, the modem minimizes power usage. Until you add an internal modem, the modem opening is covered by a reusable cap.

- **Apple Desktop Bus**

You attach additional input devices through the Apple Desktop Bus port. If you use a mouse, it must be the low-power mouse designed especially for the Macintosh Portable. Any other mouse will cause radio frequency interference. Battery time will also suffer if you connect devices that are not specifically designed for low power consumption. The low-power mouse can be identified by the icon on the bottom of the mouse, next to the serial number (illustrated below).



- **Printer and Modem Ports**

The Macintosh Portable has two RS-422 serial I/O ports, each of which has a mini-8 connector. The ports are identical except that the modem port has a higher interrupt priority, which makes it more suitable for high-speed serial communications. The modem port also supports synchronous transmission by using the GPI signal.

Using the internal modem slot disables the modem port. An installed modem uses the internal modem port unless you override the default by selecting the external modem port from the Control Panel (see the illustration on page 10).

- **Audio**

With the Apple Sound Chip and two Sony sound chips, the Macintosh Portable uses the same basic sound circuit found in the Macintosh SE/30, IIcx, II, IIx, and IIci computers.

The jack is standard line level—approximately 1.5 volts peak-to-peak—and can support a load of 8 to 600 ohms. Source impedance is approximately 47 ohms, so you can connect the jack to almost any audio amplifier or amplified speakers.

- **Power Adapter Port**

The power jack requires a 7.5-volt input source. The power adapter provided by Apple supplies 0.005 to 2.0 A (1.5 nominal) of DC current at 7.0 to 7.6 volts (7.5 nominal).

- **Internal Connectors for Keyboard and Trackball**

The Macintosh Portable has two internal connectors—one for the keyboard and one for the trackball. The standard 63-key keyboard uses exactly the same switches as the Apple Keyboard and Apple Extended Keyboard.

You can replace the trackball with an optional numeric keypad for use with number-intensive applications. The trackball (or the keypad) can be mounted on either side of the keyboard.

- **Power Adapter**

The Macintosh Portable Power Adapter supplies +7.5 volts DC. There are five different versions (for the United States and Canada, Japan, the United

Kingdom, Europe, and Australia), and each version has a plug that is appropriate for the type of power outlet found in the region. You can use the adapter in most voltage ranges; it accepts a square wave from an inverter.

Macintosh Portable Options

The following Macintosh Portable options are currently available, unless otherwise noted:

- **40MB Internal, Low-Power Hard Disk**

The Macintosh Portable can include an internal, low-power 40MB SCSI hard disk that features 28-millisecond access time. The high-performance drive is also power-efficient, requiring very little power. Because the computer uses a nonstandard, 34-pin connector, you can use only hard disks specifically designed for the Macintosh Portable. Other drives may draw too much power and damage the computer. The drive must be installed by an authorized Apple service provider.

- **Macintosh Portable Data Modem 2400**

The Macintosh Portable Data Modem 2400 is a low-power, 2400-baud modem designed especially for the Portable. The full-duplex asynchronous data modem provides auto-dial and auto/manual answer, and is compatible with the Bell 103, Bell 212A, CCITT V.22, and CCITT V.22bis communications standards and the Hayes AT command set with extensions. It is certified for use in the United States and Canada. Such standardization provides access to applications and information from a variety of remote hosts, databases, and on-line information services.

You can easily install the Macintosh Portable Data Modem 2400 by fitting it into the computer's dedicated modem slot.

- **Apple International XP 2400 Modem**

This modem is also a full-duplex asynchronous Hayes-compatible data modem. It supports the same transmission standards as the Macintosh Portable Data Modem 2400, as well as CCITT V.23, the Teletext standard. It also has an optional error correction and data compression plug-in module that supports Microcom Network Protocol (MNP) Classes 4 and 5.

The International XP 2400 uses a variety of adapter modules called Data Access Arrangement (DAA) to connect to the various telephone systems in Europe.

- **Macintosh Portable 1MB Memory Expansion Kit**

Apple offers a 1MB memory expansion card for the Macintosh Portable to bring total system memory to 2MB. You can install the card yourself by plugging it into the Macintosh Portable RAM expansion slot.

- **Macintosh Portable Video Adapter**

With the addition of Apple's user-installable Video Adapter, available in spring 1990, the Macintosh Portable can drive external monitors, VCRs, and projection systems. Connecting to the external video port, the Video Adapter supports Macintosh II video (the Apple High-Resolution Monochrome Monitor and the AppleColor High-Resolution RGB Monitor); NTSC-, PAL-, and SECAM-standard televisions; and VCRs at 640 by 400 pixels and at 1 bit per pixel.

- **Macintosh Portable Rechargeable Battery**

The optional Macintosh Portable Rechargeable Battery is identical to the battery that comes with the computer; you can use it to replace the original battery, or as a spare when the original battery runs low. The 6-volt battery provides the Portable with safe, maintenance-free operation, and you can recharge it with the computer or with the optional Macintosh Portable Battery Recharger. (You'll need eight hours or less to fully charge the battery, depending on how much charge was left in the battery.)

- **Macintosh Portable Battery Recharger**

Available in winter 1990, the external Macintosh Portable Battery Recharger charges a spare battery using the same power adapter that comes with your computer. Typical recharge time is less than three hours. A two-step charging circuit in the battery cradle protects the battery from an overcharge, so that the battery can be left on the charger when not in use. A pair of LEDs indicate the input power and battery charge status.

- **Numeric Keypad Module**

You can replace the trackball with an 18-key numeric keypad if you use the low-power mouse (connected to the Apple Desktop Bus port on the back of the unit) as a pointing device. The Macintosh Portable Numeric Keypad Module provides the same keypad layout as that of the Apple Keyboard and the Apple Extended Keyboard; there are no new keystrokes or patterns to learn. The keypad can be installed on the right or left side of the keyboard, for right-handed or left-handed operation. The Numeric Keypad Module must be installed by an authorized Apple service provider.

- **Second Internal SuperDrive**

The Macintosh Portable supports a second internal SuperDrive, which must be installed by an authorized Apple service provider. The second SuperDrive is installed in the same physical location as the hard disk; you cannot install both a hard disk and a second internal floppy disk drive.

Availability

The Macintosh Portable is available in two configurations:

- 1MB of RAM; one internal SuperDrive
- 1MB of RAM; one internal SuperDrive; internal 40MB hard disk (with System Software Version 6.0.4 and HyperCard Version 1.2.5 installed)

Macintosh Portable Q&A

Q: What are the three buttons on the left side of the Macintosh Portable computer?

A: The three buttons are the Reset switch, the Nonmaskable Interrupt (NMI) switch, and a locking slider that guards against the switches' being hit inadvertently. The Reset and Interrupt switches cannot be operated while the lock is positioned away from them.

All Macintosh computers have Reset and NMI switches. The Reset switch resets the processor and reboots the computer. Because any unsaved data is lost when you press the Reset switch, you should use it only when an error occurs and the computer does not respond to mouse or keyboard commands. The Interrupt switch provides a nonmaskable interrupt that is used by programmers to debug their code.

On the Macintosh Portable, the Reset and Interrupt switches have an additional function. They are used to reset the power manager (the dedicated processor that optimizes power consumption). If you see the "sad Macintosh" when you start up the computer, the power manager may need to be reset. Press and release the switches in the following sequence:

1. Press and hold Reset.
2. Press Interrupt.
3. Release Interrupt.
4. Release Reset.

Now you can press any key on the keyboard to start the Macintosh Portable.

Q: What is the Rest feature? Can it be disabled?

A: After 15 seconds of no activity, the Macintosh Portable goes into rest mode. The number of wait states increases from 1 to 64, reducing the operating speed of the computer to the equivalent of 1 MHz. The Macintosh Portable won't go into rest mode if it detects activity such as the following:

- A changing cursor
- The watch cursor (even if stationary)
- Any Apple Desktop Bus action (keyboard or mouse)
- Reading from or writing to the hard disk or floppy disk drive

You can disable the Rest feature by following these steps:

1. Open the Control Panel.
2. Click the Portable icon.
3. Hold down the Option key while you click "Minutes Until Automatic Sleep" in the upper left box. A dialog box appears that allows you to disable the Rest feature.

Q: What should I do if I'm not going to use my Macintosh Portable for some time?

A: It's best to keep the computer plugged in while you're not using it. The battery charger is designed to regulate the amount of current supplied to the battery, and will automatically switch to trickle-charge mode when the battery is full.

If you can't leave the computer plugged in and you're not going to use it for up to three weeks, you can leave the battery inside the computer after charging it fully (overnight).

If you won't be using the computer for more than three weeks, charge the battery fully. Then either remove the battery or use the mylar sheet that came with your computer to isolate the battery from the contacts. Store the battery (or the computer with the mylar sheet isolating the battery) in a cool place. The following chart indicates how long it will take for a fully charged battery to lose half its charge when stored at the specified temperatures.

Temperature	Number of Days
50° F (10° C)	700 days
68° F (20° C)	500 days
95° F (35° C)	200 days
113° F (45° C)	100 days

Q: How many times can the battery be recharged?

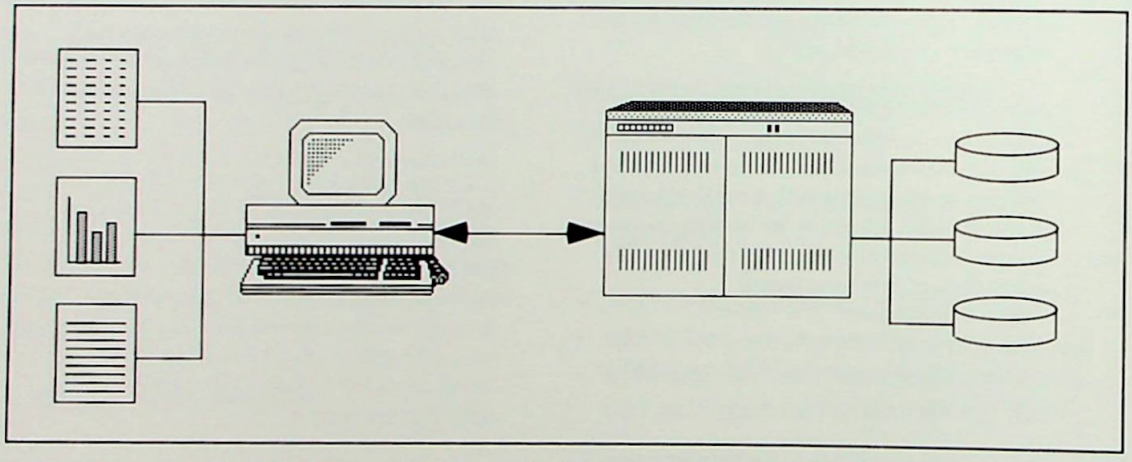
A: The number of recharge/discharge cycles is influenced by temperature as well as by speed and depth of discharge. The number of cycles increases as both temperature and speed/depth of discharge decrease. A typical value is about 1,000.

CL/1: Overview

Apple acquired Network Innovations Corporation in March 1988 as part of its commitment to providing products that interact transparently with foreign data and host systems. Now an independent Apple subsidiary, Network Innovations adds its CL/1™ products to the line of Apple networking and communications products introduced in June 1989.

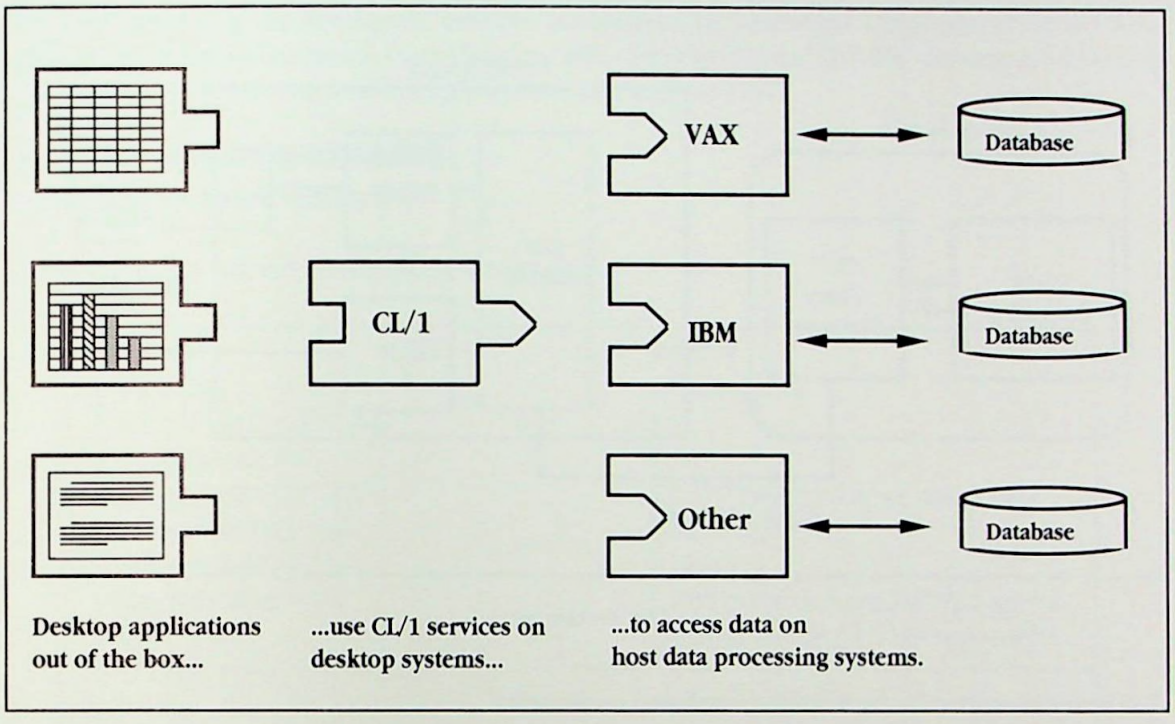
Product Description

CL/1 is a host database access tool that provides a connectivity language and a set of supporting software components for linking personal computer applications to host databases. CL/1 servers provide desktop access to host databases—relational, hierarchical, or flat-file—and allow users to manipulate host data with familiar personal computer applications. The connectivity language conforms to the Structured Query Language (SQL) ANSI standard level 1.



A standard connectivity language linking desktop applications to host data

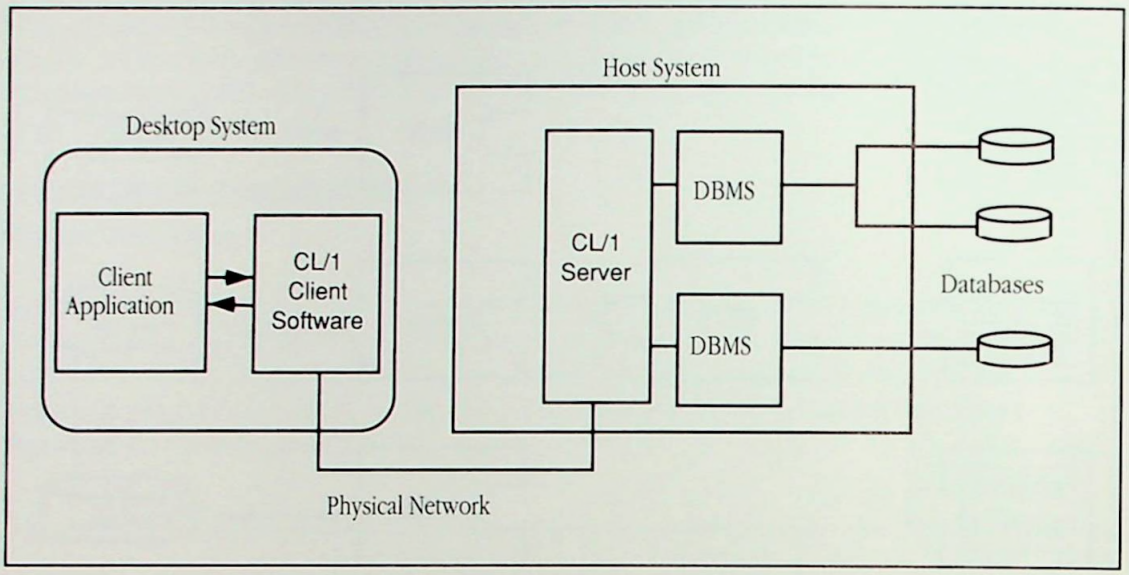
CL/1 provides uniform access to host database data across a wide range of host hardware platforms, operating systems, database management systems, and network connections. Insulating the desktop application from such details and differences, CL/1 allows the application to focus on providing better interaction between "personal" processing on the desktop and organizational computing on the host system. A desktop application that supports CL/1 can access database data on a CL/1-supporting host system and integrate the information into the data available to the desktop application user.



"Plug and play" connectivity offered by CL/1

The CL/1 API (application program interface) gives software developers access to a broad range of shared database data through a single programming effort. Developers can incorporate host-based data into their applications in two ways: directly, as built-in functionality; or indirectly, through peripheral applications, as add-on functionality. CL/1 also provides network adapters (communications drivers) that allow programmers to bypass the task of communications programming.

CL/1 is a distributed processing facility with a client/server architecture. Key components of an installation are the client application, CL/1 API, client system, host system, communications network, CL/1 server, and host DBMS (database management system).



CL/1 architecture

CL/1 provides support for the following installation components:

Client System	Host System	Host DBMS	Communications
Macintosh	VAX™/VMS™	ORACLE	Serial
	VM/CMS	SYBASE	ADSP
	MVS/XA/ESA	Informix	3270 DSP
	A/UX	Ingres	
		Rdb	
		RMS Flat Files	
		SQL/DS	
		DB2	

CL/1 Product Offerings

The following CL/1 products are now available:

- CL/1 Developer's Toolkit for Macintosh
- CL/1 Server for VAX/VMS
- CL/1 Server for VM/CMS
- CL/1 Server for MVS/XA/ESA-TSO
- CL/1 Server for A/UX (available to developers only)

The VAX/VMS Server and Developer's Toolkit for Macintosh are included in the Winter issue of the *APDAlog* catalog, scheduled for distribution in mid-February 1990. The VM/CMS and MVS/TSO Servers are included in the Spring issue of *APDAlog*, scheduled for distribution in mid-May 1990.

Supported Software Versions

Following are the software versions supported by CL/1:

PRODUCT	VERSION
VAX/VMS	4.7 through 5.2
CL/1 Server for VAX/VMS	1.0
AppleTalk for VMS	2.0
ORACLE for VAX/VMS	5.1.22 (Version 6.0 is not supported.)
SYBASE for VAX/VMS	3.0.1 through 3.2
Informix for VAX/VMS	2.10.04
Ingres for VAX/VMS	6.1/02 (with patch applied) through 6.2
Rdb	3.0 (Beta Version 3.1 is not supported.)
A/UX	1.0 and 1.1.1
CL/1 Server for A/UX	1.0ß5.01
Informix for A/UX	2.10.04
Macintosh System Software	6.0.2 through 6.0.4
HyperCard	1.2.2 through 1.2.5
CL/1 Developer's Toolkit for Macintosh	1.0
ADSP	1.0
MPW® C Objects	2.0 through 3.0
MPW Pascal Objects	2.0 through 3.0
THINK's Lightspeed C Objects	3.0

Technical Support

All CL/1 products carry 90 days of free technical support from Apple's Direct Response Center℠. Users can extend their access to the Direct Response Center beyond 90 days by purchasing a support contract on an annual basis.

CL/1 Applications

Following is a partial list of applications that incorporate support for CL/1:

- **Generic database browsers**

Clear Access
Fairfield Software, Inc.
200 West Lowe Avenue
Fairfield, IA 52556
(515) 472-7077

GQL
Andyne Computing Limited
544 Princess Street, Suite 202
Kingston, Ontario, Canada K7L 1C7
(613) 548-4355
1-800-267-0665

MacDBC
Access Technology, Inc.
Two Natick Executive Park
Natick, MA 01760-2030
(508) 655-9191

Executive Query Tool
Application Design, Inc.
485 Alberto Way
Los Gatos, CA 95032
(408) 354-7214

- **Spreadsheets**

Full Impact
Ashton-Tate
Northern California Product Center
6411 Guadaloupe Mines Road
San Jose, CA 95120
(408) 268-2300

Wingz
Informix Software, Inc.
16011 College Boulevard
Lenexa, KS 66219
(913) 599-7100
1-800-323-5423

- **Desktop mapping**

GeoQuery
Odesta Corporation
4085 Commercial Avenue
Northbrook, IL 60062
(312) 498-5615
1-800-323-5423

Tactician
Tactics International
16 Haverill Street
Andover, MA 01810
(508) 475-4475

- **Archiving**

Archie
C.V. Softcore Creative Technology S.C.
Waverse Steenweg, 1045
1045, Chaussee de Wavre
Brussels 1160, Belgium
(02) 647 4000
AppleLink®: BEL0038

- **Customized application generators**

CL/1 for HyperCard
APDA
Apple Computer, Inc.
20525 Mariani Avenue, M/S 33G
Cupertino, CA 95014
(408) 562-3910
1-800-282-2732 (U.S)
1-800-637-0029 (Canada)
AppleLink: APDA

Fusion
Millennium Software
1907 South Coast Highway
Laguna Beach, CA 92651
(714) 497-7439

Nexpert Object
Neuron Data, Inc.
444 High Street
Palo Alto, CA 94301
(415) 321-4488

- **Database application program interfaces**

4th Dimension
ACIUS, Inc.
10351 Bubb Road
Cupertino, CA 95014
(408) 252-4444

Double Helix
Odesta Corporation
4084 Commercial Avenue
Northbrook, IL 60062
(312) 498-5615

Omnis
Blyth Software, Inc.
2929 Campus Drive, Suite 425
San Mateo, CA 94403
(415) 571-0222

Macintosh IIci: Compatibility Report

This report lists third-party software applications that Apple has tested on the Macintosh IIci. The report is not an endorsement for the listed products; it's intended only to provide you with information about basic compatibility of applications with the Macintosh IIci. For more details, please contact the developer or publisher.

Each application was run through a series of "Quick Looks" (launch, open a simple document, open desk accessories, cut/paste, and print). The compatibility rating pertains only to the version listed; in some instances the version number may not correspond to the currently available version.

Note that you should use Macintosh System Software Version 6.0.4 and HyperCard Program Version 1.2.5 with the Macintosh IIci computer.

The following applications have been rated "A" or "B." "A" indicates that the product is compatible with the IIci, and "B" indicates that the product is compatible, but with minor bugs.

Product	Developer	Version	Rating
Adobe Illustrator 88	Adobe Systems	1.8.3	A
ArchiText	BrainPower, Inc.	2.0.1	A
Beyond Dark Castle	Silicon Beach Software	1.0	A
The Big Thesaurus	Deneba Software	1.0	A
Claris CAD	Claris Corporation	1.0	A
Cricket Draw	Cricket Software	1.1.1	B
Cricket Presents	Cricket Software	1.0	A
DesignScope	BrainPower, Inc.	1.0	A
Desk Draw	ZedCor	0.96	A
Desk Paint	ZedCor	2.0	A
DiskFit	SuperMac Software	1.4	A
Dollars & Sense	Monogram Software	4.1c	A
Double Helix	Odesta Corporation	2.0 r51	B
4th Dimension	ACIUS, Inc.	1.06	B
MacGolf Classic	Practical Computer	3.0	B
Mathematica	Wolfram Research	1.03	A
Microsoft Excel	Microsoft Corporation	1.5	A
Microsoft Mail	Microsoft Corporation	2.0	A
Microsoft Word	Microsoft Corporation	3.02	B
Microsoft Word	Microsoft Corporation	4.0	A
Microsoft Write	Microsoft Corporation	1.00	A
Modern Artist	The Reed Institute	2.0	B
MORE II	Symantec	2.0	B
MORE II	Symantec	2.01	A
Network DiskFit	SuperMac Software	1.5	A
Nisus	Paragon Concepts	1.01	B
Omnis 3 Plus	Blyth Software	3.01	A

Product	Developer	Version	Rating
Omnis 3 Plus	Blyth Software	3.3	A
PageMaker	Aldus	3.01	B
Persuasion	Aldus	1.0	A
PictureBase	Symmetry	1.2.3	B
PixelPaint	SuperMac Software	2.0	A
Plains & Simple	Great Plains Software	1.02	A
Plains & Simple	Great Plains Software	1.05	A
PowerPoint	Microsoft Corporation	2.01	B
The Print Shop	Broderbund Software	1.3	A
QuarkXPress	Quark	2.0	A
Quicken	Intuit	1.2	A
QuickMail	CE Software	2.0	A
Ready,Set,Go!	Letraset	4.5	A
Ready,Set,Show!	Letraset	1.0	A
Red Ryder	FreeSoft Company	10.3	A
Smartcom II	Hayes Microcomputer Products	3.1a	A
SoftPC	Insignia Solutions	1.21	A
SoundEdit	Farallon Computing	1.0	A
Spellswell	Working Software, Inc.	2.0g	A
StatView II	Abacus Concepts	1.02	A
STELLA for Business	High Performance Systems	2.0	A
Studio/1	Electronic Arts	1.0	A
Studio/8	Electronic Arts	1.0	A
Suitcase II	Software Supply	1.21	A
SuperLaserSpool	SuperMac Software	2.0	A
SuperPaint	Silicon Beach Software	2.0	A
Super 3D	Silicon Beach Software	1.0	A
Swivel 3D	Paracomp, Inc.	1.0	A
Tetris	Spectrum HoloByte	1.0	A
THINK C	Symantec	3.01	B
Timbuktu	Farallon Computing	2.01	A
Timbuktu Remote	Farallon Computing	1.01	A
TOPS	Sun Microsystems	2.0	A
Trapeze	Data Tailor	2.1	A
Turbosynth	Digidesign	1.0	A
VersaCAD	VersaCAD Corporation	2.0	A
VersaTerm-PRO	21st Century	2.20	A
VideoWorks II	MacroMind	2.0	A
Wingz	Informix Software	1.1	A
WordPerfect	WordPerfect Corporation	1.0	A
WriteNow	T/Maker Company	2.0	A

Macintosh Portable: Compatibility Report

This report lists third-party software applications that Apple has tested on the Macintosh Portable. The report is not an endorsement for the listed products; it's intended only to provide you with information about basic compatibility of applications with the Macintosh Portable. For more details, please contact the developer or publisher.

Each application was run through a series of "Quick Looks" (launch, open a simple document, open desk accessories, cut/paste, and print). The compatibility rating pertains only to the version listed; in some instances the version number may not correspond to the currently available version.

Note that you should use Macintosh System Software Version 6.0.4 and HyperCard Version 1.2.5 with the Macintosh Portable computer.

The following applications have been rated "A" or "B." "A" indicates that the product is compatible with the Portable, and "B" indicates that the product is compatible, but with minor bugs.

PRODUCT	DEVELOPER	VERSION	RATING
Adobe Illustrator 88	Adobe Systems	1.8.3	B
Canvas	Deneba Systems	2.0	B
C.A.T.	Chang Labs	2.0	B
Claris CAD	Claris Corporation	1.0v1	A
Copy II Mac	Central Point Software	7.1	A
Cricket Draw	Cricket Software	1.1	A
Cricket Draw	Cricket Software	1.1.1	A
Cricket Graph	Cricket Software	1.2.1	B
Cricket Paint	Cricket Software	1.0	A
Crystal Quest	Greene, Inc.	2.2c	B
Desktop Express	Dow Jones	1.0	A
DiskFit	SuperMac Software	1.5	A
Dollars & Sense	Monogram Software	4.1c	A
Easy 3D	Enabling Technology	1.01	A
FileMaker II	Claris Corporation	1.0	A
Fontographer	Altsys Corporation	2.3	A
4th Dimension	ACIUS, Inc.	1.0.6	B
FoxBASE+	Fox Software	1.10	B
FullWrite Professional	Ashton-Tate	1.0	B
Insight—General Ledger	Layered Software	2.02	A
Mac 3D	Challenger Software	2.1	B
MacDraw II	Claris Corporation	1.1	A
MacGolf	Practical Computer	3.0	A
MacInTax 88	Softview, Inc.	2.0	B
MacLink*Plus*	DataViz, Inc.	4.12	A
MacMoney	Survivor Software	3.02.01	B
MacNet	Connect, Inc.	1.0	B

Product	Developer	Version	Rating
MacPaint	Claris Corporation	2.0	B
MacProject II	Claris Corporation	1.0	B
MacTools	Central Point Software	7.2	B
MacWrite II	Claris Corporation	1.0v2	B
Mathematica	Wolfram Research	1.03f31	A
Microsoft Excel	Microsoft Corporation	2.2	B
Microsoft File	Microsoft Corporation	2.0	A
Microsoft File	Microsoft Corporation	2.00a	B
Microsoft Word	Microsoft Corporation	3.02	B
Microsoft Word	Microsoft Corporation	4.0	B
Microsoft Write	Microsoft Corporation	1.00	B
MORE II	Symantec	2.0	A
Omnis 3 Plus	Blyth Software	3.3	A
Persuasion	Aldus	1.0	A
PictureBase	Symmetry	1.2.3	B
Pyro	Bill Steinberg	3.0	A
Quark Style	Quark	1.0	A
QuarkXPress	Quark	2.0	A
Quicken	Intuit	1.0	A
Ready,Set,Show!	Letraset	1.0	A
Smartcom II	Hayes Microcomputer Products	3.1a	B
Smartcom II	Hayes Microcomputer Products	3.1c	A
Spellswell	Working Software, Inc.	2.0g	B
StatView II	Abacus Concepts	1.0	B
STELLA for Business	High Performance Systems	2.0	A
SuperPaint	Silicon Beach Software	2.0	B
Super 3D	Silicon Beach Software	1.0	B
Symantec Utilities	Symantec	1.0	A
THINK C	Symantec	3.0	A
VersaCAD	VersaCAD Corporation	2.0	A
VersaTerm-PRO	21st Century	3.0.1	A
VideoWorks II	MacroMind	2.02	A
VideoWorks II	MacroMind	2.1	A
Wingz	Informix Software	1.0	A
WordPerfect	WordPerfect Corporation	1.01	B
WriteNow	T/Maker Company	2.0	A

Macintosh Portable, Macintosh IIci, and MIDI Software

MIDI applications that were available before the introduction of the Macintosh Portable and Macintosh IIci (in September 1989) won't work on the Portable or IIci. Many publishers of MIDI applications have updated their software to accommodate these new models of the Macintosh. Contact the publisher of your MIDI application to verify that your version of the software will work on the newest Macintosh systems.

MIDI Management Tools software provides a set of toolbox calls that allow developers to use the operating system instead of directly programming the hardware. MIDI applications that support Apple's MIDI Management Tools software will require Version 1.2 of the software for compatibility with the Macintosh Portable and Macintosh IIci.

MIDI Management Tools Version 1.2 is a new release intended to resolve issues involving a change in the serial ports of the Macintosh Portable and Macintosh IIci. No new functionality or features were added over Version 1.1. For ordering information, contact APDA™ at the following address:

APDA
Apple Computer, Inc.
20525 Mariani Avenue, M/S 33G
Cupertino, CA 95014
1-800-282-2732 (United States)
1-800-637-0029 (Canada)
(408) 562-3910
AppleLink: APDA

SuperDrive and Disk Compatibility

The Apple FDHD SuperDrive can read from and write to Macintosh 400K, 800K, and high-density 1.4MB disk formats. The SuperDrive also enables the Macintosh to read from and write to 800K ProDOS, MS-DOS, and OS/2 720K or 1.44MB formats when used with the Apple File Exchange utility, SoftPC from Insignia Solutions, or Dayna's DOS Mounter.

3.5-Inch Macintosh Disks: Background

The SuperDrive requires 3.5-inch disks, which are available in Macintosh format in single-sided (400K), double-sided (800K), and high-density (1.4MB) versions. Each type of disk carries an implied manufacturer's guarantee that it will provide few or no errors at the rated storage capacity.

You can format a single-sided disk to hold 400K of data, and a double-sided disk to hold 400K or 800K of data. If you format an 800K disk as a 400K disk, you lose about half the rated storage capacity. (However, you may want to format an 800K disk with 400K capacity if you intend to share data with a user who has a Macintosh 128K, 512K, or XL computer, which can read only 400K disks.)

Single- and double-sided disks are manufactured by the same process, although single-sided disks don't carry the implied manufacturer's guarantee for 800K-capacity formatting. High-density disks are manufactured by another process, involving different oxides and a different rating of magnetic flux capacity per square inch. You should avoid formatting a high-density disk to 400K or 800K capacity with a Macintosh computer that doesn't support the SuperDrive. Though such formatting is physically possible, the manufacturer's guarantee applies only to the high-density format.

If you compare a 3.5-inch single- or double-sided disk with the 3.5-inch high-density disk, you'll notice only small variations. Two differences can assure you that you're dealing with a high-density disk:

- A "bonus hole" at the top of the disk on the side opposite the Write Enable/Write Protect tab
- The letters "HD" near the shutter at the front face of the disk

The following Macintosh computers support the SuperDrive: Macintosh IIci, IIx, IIcx, Portable, and SE/30 computers, and Macintosh SE computers sold after August 2, 1989. You can upgrade Macintosh II computers and older Macintosh SE computers to support the SuperDrive. (For details, see the article "Current Apple Upgrades and Updates," page 33.)

High-Density Disks and the Macintosh

Whereas 400K and 800K disks are identical in operation, high-density disks are completely different media. The process for reading and writing information to high-density disks is distinct from the 400K/800K mode of disk operation. The SuperDrive can tell the difference between the two modes.

When you insert a 3.5-inch high-density disk into a Macintosh computer that doesn't support the SuperDrive (or into an Apple II or IBM PC–compatible machine), the computer acknowledges it as a single- or double-sided disk and tries to operate with it in the normal way.

When you insert a high-density disk into a Macintosh that does support the SuperDrive, the drive senses the bonus hole and locks itself into the appropriate mode for a 1.4MB disk. You cannot override this SuperDrive function.

The following cases provide specific explanation:

- If you insert and format a new double-sided disk with 400K capacity, you can use the disk with all Macintosh computers. If you format the disk with 800K capacity, you can use it with all Macintosh computers other than the Macintosh 128K, 512K, and XL. As long as you don't format a high-density disk with 400K or 800K capacity, you will not have trouble trading media with Macintosh computers that don't support the SuperDrive.

- If you format a double-sided disk to 800K capacity on a Macintosh computer other than the 128K, 512K, or XL, you can use it in a SuperDrive-equipped Macintosh. Because the SuperDrive doesn't detect a bonus hole, it presumes that the disk is a 400K- or 800K-formatted disk. The SuperDrive software reads the data, and operation is the same as it would be on a Macintosh without the SuperDrive.

- If you format a high-density disk to 800K capacity on a Macintosh that doesn't support the SuperDrive and then insert it into a SuperDrive-equipped Macintosh, the drive senses the bonus hole and presumes that the disk is in 1.4MB format. It tries to read the information in 1.4MB mode and sees nothing recognizable. The SuperDrive cannot read the 400K/800K format of the high-density disk; it sends a message that the disk is not readable and should be ejected or initialized.

  In such a situation, you can insert the original high-density disk into the first Macintosh and copy the 800K data from the high-density disk onto an 800K-formatted double-sided disk. You can then put the double-sided disk into the SuperDrive; the drive will read the data normally.

SuperDrive with MS-DOS Computers

The SuperDrive can exchange data on disks between Macintosh computers and MS-DOS or OS/2 machines equipped with 3.5-inch drives. The following cases illustrate the supported and unsupported combinations:

- You can format a new double-sided disk to 720K capacity on an MS-DOS computer, copy Lotus 1-2-3 spreadsheets from the hard disk to the newly formatted disk, remove the disk from the MS-DOS machine, and go to the Macintosh. Launch the Apple File Exchange (AFE) and insert the MS-DOS disk into the

SuperDrive. The AFE window shows you a listing of the contents of the disk, including the spreadsheet you want to transfer to the Macintosh. All operations behave as you would expect.

- You can format a new high-density disk to 1.44MB capacity on an MS-DOS computer, copy your spreadsheets to the newly formatted disk, remove the disk, and go to the Macintosh. Launch the Apple File Exchange (AFE) and insert the MS-DOS disk into the SuperDrive. The AFE window shows you a listing of the contents of the disk, including your spreadsheet; everything behaves as expected.

- If you format a new high-density disk to 720K capacity on an MS-DOS machine and then copy your spreadsheets to it, the MS-DOS machine doesn't sense that the disk is high-density. The computer senses only that it has successfully moved data to the target disk. If you then go to the Macintosh, launch the Apple File Exchange, and insert the disk into the SuperDrive, you'll find that the SuperDrive cannot read the 720K-formatted MS-DOS disk in the 1.4MB mode. The Macintosh responds with the message that the disk is not readable.

- If you format a new double-sided disk to 1.44MB capacity on an MS-DOS machine (an unsupported configuration), copy your data, and then go to the Macintosh, the SuperDrive will not be able to read the 1.44MB-formatted MS-DOS disk in the 720K mode. You'll get a message that the disk is not readable.

Points to Remember

When you use the SuperDrive, make sure you choose the correct disk for the job. Two rules eliminate most of the confusion users experience with the SuperDrive:

- If you exchange disks with older Macintosh computers, Apple II computers, or computers that use 720K-formatted MS-DOS disks, use only single- or double-sided disks.

- If you exchange data with Macintosh computers that support the SuperDrive, or with computers that use 1.44MB-formatted MS-DOS disks (most PS/2 machines fit this description), make sure you use high-density disks.

Macintosh Video Projection Tips

The following information includes Macintosh video projection tips and explanations of relevant standards and terminology.

Video Projection Information

- A video projection system for the Macintosh II must support a horizontal frequency rate of at least 35 KHz. Try to provide some "head room" by purchasing equipment with at least a 42-KHz horizontal frequency rate.

- Brightness is measured in lumens. Though 300 lumens is acceptable, 600 lumens is preferable in a room that seats 50 people or more.

- You need a special video cable or an adapter box to connect a projector to the Macintosh II family of computers. Projection system vendors can provide the device, which separates the RGB and Sync signals and connects through the video card for the AppleColor High-Resolution RGB Monitor.

- Standard projection screen sizes are 6 by 8 feet and 7 by 10 feet. Since most projection units have a default convergence set within ranges appropriate to these screen dimensions, it makes sense to use a standard size.

- If you choose a rear-screen projection option, you can improve the overall presentation by using screen drapes.

- When you do multimedia presentations, you may have more than one video source to display—for example, Macintosh and VCR or videodisc. Some projection systems can switch sources via remote control, giving your presentation a cleaner flow.

Standard RGB Display Signal

RS video standards are set by the Electronic Industries Association. The Macintosh II video card uses an approximation of the RS-343 display signal, which is a monochrome video signal combined with a composite sync signal (horizontal and vertical scan control). Horizontal and vertical scan rates are timed so that the display electron guns produce even, progressively horizontal scans. The importance of the RS-343 standard is its provision for a timing and voltage-level signal that allows the display and generation of high-resolution video.

While the Macintosh II version of the RS-343 signal differs somewhat from the standard, it follows the guidelines for connection to RS-343 display devices. The major differences are these:

- The separate TTL level composite sync signal found on pin 3
- The separate video lines used to produce RGB color

- A vertical scan rate of 66.67 Hz to reduce screen flicker (RS-343 provides for a 60-Hz signal)
- A voltage white level of 1 volt for red and blue signals and 1.3 volts for the green signal

Inclusion of the analog composite sync found on pin 5 of the video card connector—called the "green signal"—allows monochrome composite video.

Components of an NTSC/RS-170 Timing Signal

RS-170 is a standard that defines the timing of broadcast video in the United States, Japan, and several other areas. RS-170 specifies a 15.75-KHz horizontal and a 60-Hz vertical interlaced scan frequency. *Interlacing* is the process by which two fields—called scan lines—are interleaved on the screen. In 1957, when the RS-170 standard was created, the speed of broadcast signals and picture tubes required that an image be displayed in parts, allowing the partial update of video pictures to go unnoticed by the viewer. An RS-170 video frame contains 525 lines and is displayed 30 times per second—for a total of 15,750 lines, or 15.75 KHz. Of these lines, only the odd or even lines are displayed with each field. Like the RS-343 standard, RS-170 is strictly a timing specification for monochrome video signals. Combining three such signals to control individual red, green, and blue sweep circuits allows the creation of a full-color system. The RS-170 mode is included on the Macintosh II video card so that large-screen projectors, which are incapable of high-frequency scans, can display the Macintosh II video in the usual RS-170 broadcast standard.

Terminology

Bandwidth is the signal width—that is, how much information is being delivered. The higher the bandwidth, the greater the amount of video information that can be delivered and displayed by a monitor.

Dot pitch is the size of the phosphor dots on the monitor screen. It determines the precision with which the video information can be duplicated.

The *grill pitch* of a monitor refers to the width of the lines in the color mask that blocks the color electron beams.

Scan rate is the time it takes the electron gun to move across one line of the screen or repeat one entire screen—values known as horizontal and vertical sync periods, respectively.

Pin cushion is a display effect that results from warping or curved display screens.

Convergence refers to beam position accuracy. Color systems require exact accuracy of beams—for both position and speed—to properly produce the desired colors from their phosphors.

Recommended Macintosh System Software Configurations

System/ Finder	128K	XL	512K	512K Enhanced	Plus	SE	SE/30	IIcx	II	IIx	IIci	Portable
2.0/4.1	1											
3.2/5.3		1	1	1	2							
3.3/5.4			3	3*	4							
4.0/5.4				2	2	2						
4.1/5.5				2	2/4	2/4			2/4			
4.2/6.0						2/4	2/4			2/4		
6.0.2/6.1						2/4	2/4			2/4		
3.4/6.1					5**							
6.0.3/6.1						1/5	1/5	1/5	1/5	1/5	1/5	
6.0.4/6.1											1/5***	1/5***

1 = Best system software for the hardware model
2 = Fine to use with the hardware model
3 = Best system software for use with AppleShare 1.1 (use the Installer)
4 = Fine to use with AppleShare
5 = Best system software for use with AppleShare 2.0.1 (use the Installer)

* If installing on the Macintosh 512K Enhanced, use the Installation disk for the Macintosh 512K, not the Installation disk for the Macintosh Plus, Macintosh SE, or Macintosh II.

** If installing on a Macintosh 512K Enhanced, use the Installation disk for the Macintosh 512K Enhanced, not the Installation disk for the Macintosh Plus, Macintosh SE, or Macintosh II.

*** Macintosh System Software Version 6.0.4 is required for the Macintosh IIci and the Macintosh Portable. Version 6.0.4 offers no increased functionality over Version 6.0.3.

Current Apple Upgrades and Updates

An **upgrade** enhances features of existing hardware or software. Generally, an upgrade involves a fee, and any additional Apple hardware must be installed by an authorized Apple service provider.

A software **update** consists of enhancements, fixes, or patches to software. An update to Apple software is handled through an authorized Apple dealer or your Apple sales representative.

Following is a summary of the Apple upgrades and updates currently available for Macintosh products.

Macintosh 128K, 512K Upgrade to Macintosh Plus

Owners of Macintosh 128K and Macintosh 512K computers can upgrade to the Macintosh Plus. The upgrade consists of the Macintosh Plus Disk Drive Kit (part number M2516) and the Macintosh Plus Logic Board Kit (part number M2518/A).

Macintosh SE/30 Logic Board Upgrade

Owners of 1-megabyte or 4-megabyte Macintosh SE computers can upgrade to the Macintosh SE/30 by purchasing the Macintosh SE/30 Logic Board Upgrade (part number M0713). Owners who have a 2-megabyte or 2.5-megabyte Macintosh SE must purchase an additional 2 megabytes of memory to use the upgrade. Systems that have two internal 800K drives must have one drive removed. Macintosh System Software Version 6.0.3, required by the Macintosh SE/30, is included with the upgrade.

Macintosh SE FDHD Upgrade

This kit, which includes an internal FDHD SuperDrive, a Macintosh SE FDHD ROM kit, and Macintosh System Software, allows Macintosh SE users to take advantage of FDHD capabilities without having to upgrade to the SE/30 (part number M6052).

Macintosh II Upgrade

Macintosh II users who want to achieve full system equivalence with the Macintosh IIx system can do so by replacing the Macintosh II logic board with the Macintosh IIx Logic Board Upgrade (part number M0271) and the FDHD Macintosh II Upgrade Kit (part number M6051).

Macintosh IIcx Upgrade to Macintosh IIci

Increase system speed from 16 MHz to 25 MHz and obtain the built-in video feature (part number M0295LL/A).

Apple Internal FDHD SuperDrive

This is an internal FDHD SuperDrive for use as a second floppy drive on the following computers:

- Macintosh SE upgraded to an SE/30
- Macintosh SE upgraded to an FDHD SuperDrive SE (part number M6052).
- Macintosh IIx
- Macintosh II upgraded to a Macintosh IIx

LaserWriter IIsc Upgrades

To upgrade the LaserWriter IIsc printer to the LaserWriter IINT, purchase the LaserWriter IINT Controller Card (part number M6009). To upgrade the LaserWriter IIsc to the LaserWriter IINTX, use the LaserWriter IINTX Controller Card (part number M6004).

LaserWriter to LaserWriter Plus (LaserWriter Plus Kit)

To upgrade the LaserWriter printer to a LaserWriter Plus, an authorized Apple service provider installs 1 megabyte of ROM. The customer then installs the new screen fonts using the printer installation disk (supplied).

LaserWriter PostScript Upgrade Program (LaserWriter Plus Kit)

To upgrade LaserWriter Plus ROMs to PostScript® version 47, an authorized Apple service provider installs the LaserWriter Plus Kit..

AppleScan Version 1.0.2

In addition to fixing a number of minor bugs, AppleScan™ 1.0.2 offers more control over Preview, improved compatibility with the AppleFax™ Modem, and improved transfer of PICT files. Version 1.0.2 of the AppleScan software is available free of charge.

AppleFax Firmware Version 1.2

AppleFax Firmware 1.2 fixes specific incompatibility problems with some Group 3 facsimile machines and certain phone systems, particularly Private Branch Exchange (PBX) phone systems. Version 1.2 of the AppleFax firmware is available free of charge.

AppleFax Software Version 1.2

Version 1.2 of the AppleFax Modem application and the AppleFax Modem Resource contains a number of improvements over Version 1.1, including compatibility with System Software 6.0.3, an end to "character collisions," and improved performance of the "in care of" feature. Version 1.2 of the AppleFax software is available free of charge.

MacTerminal Version 2.3

This MacTerminal® software update is available free of charge. The new version features full MultiFinder software compatibility and an improved user interface.

Claris Software

For information about upgrades and updates to the Claris MacWrite, MacPaint, MacDraw, and MacProject programs, please contact:

Claris Corporation
P.O. Box 526
Santa Clara, CA 95052
1-800-544-8554

Macintosh Technical Bulletin

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Correction

In the article "MacX: Overview" *(Macintosh Technical Bulletin*, November–December 1989, page 3), The System Requirements section states that Macintosh System Software Version 6.0.3 may be used with MacX™. The information is incorrect; MacX requires System Software Version 6.0.4 or greater.

Technical Bulletin Subscriptions

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Apple Technical Bulletins are also available as part of the Apple Software Update Program. For more information, contact your authorized Apple reseller or Apple sales representative.

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